Thames Valley Guns

BMS MILCAM Rifle - Ser No85

Introduction

I had been looking for an interesting .223 rifle for years but being a modern and very popular calibre, rifles were limited to modern bolt action designs such as Remington, Tikka, Howa and Ruger, plus the military style rifles such as the AR15 which didn't really appeal to me. I had been "been here, done it and got the T shirt" type of thing and although I liked the AR15 I get bored with them fairly easily.

I was being badgered by the Police to use my .223 slot on my license or risk loosing it and as a result I was planning to go for a Howa 1500 with a varmint barrel, nice wooden stock and a magazine extension kit. However although a nice setup I was worried that six months down the line I would get bored with it, just like I do with most modern factory rifles.

Early in 2015 I was down on Bisley ranges and noticed a rifle in the lane next to me that I had not seen since the since the the late 80's . The rifle is called a CAM and is only available in military/police circles and I came across it when I worked in the UK defence industry. A small number had made it onto the civilian circuit over the years but they are fairly rare beasts and the ones I have seen, have been tampered with or were showing their age, therefore it was nice to see a new one with a carbon fibre stock and a nice S&B Scope. Without going into to many details, an amazing opportunity arose to purchase a demo model of this unique English designed and manufactured rifle and it was an opportunity I had no intention of missing.

History

Although I have met these rifles in my travels I have no great depth of knowledge concerning their history. I first met them in the late 80's and as far as I can tell there was a series of rifles that reflect there date of introduction. Upon its unveiling the early rifles where quite unique as it was the only military grade bolt action rifle in 5.56mm at the time and was available in various different models MILCAM, MILCAM HB & SNICAM to name but a few and came with a host of attachments to suit the military user. The early rifles where fitted with a very tradition wooden stock and was designed for situations were automatic weapons were not suitable such as border police, police and militia and one of the easiest ways to identify the early rifles, is the integral iron sights and the Parker Hale type scope rail. Later rifles have no iron sights and a utilise a detachable picatinny style rail as seen below.

My rifle was an ex-demo and therefore was not strictly a production gun, it came equipped with a laminate stock, long and short picatinney rail, 20rd magazine, sling, bipod spigot, cheek piece extension, instructions and a butt plate spacer. Whilst the metalwork was pristine the furniture needed a touch of TLC. However before I "fine tuned" the rifle I did want to check its accuracy potential and therefore I quickly carried out an inspection, applied a minor service, fitted a S&B x6 scope and went off to accuracy test. This brief accuracy test was shot at 100yrds, off a bench to minimise any human error and I managed a very acceptable 13.5mm group.

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General

Before I get into the mechanics of this rifle I think it is very important to discuss this rifles design concept. As is often the case I have read some unkind comments on these Internet forums by the “amateur experts” who don't know their left elbow from their right. This is a military specification rifle manufactured from steel, with no plastic or aluminium components anywhere. Its mechanism is built for longevity, minimal component parts, it is simple and robust so it can operate in the harshest environments, it is easy to manufacture without the need for complicated machining processes and can be repaired by semi-skilled armourers. Some components such as bolt face, barrel, flash eliminator and magazine are common to the AR15 rifle and are available ”of the shelve” and therefore makes this rifle extremely good value for money.

This rifle does exactly what is says “on the side of the can” and is ideal for organisations that have a limited budget and want a accurate and robust rifle in an environment that is not necessary suitable for automatic weapons. This particular rifle is fitted with 20” heavy fluted barrel from DPMS, is 42” In length and with a S&B scope, Atlas bipod and empty magazine weighs a hefty 14 lb, however this can vary depending on barrel length, moderator, type of picatinny rail and butt plate extensions etc.

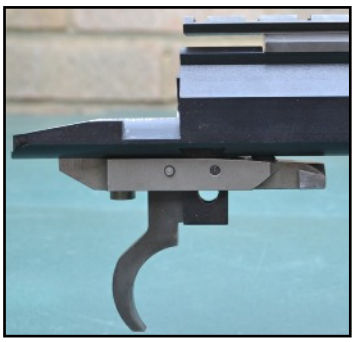
Receiver

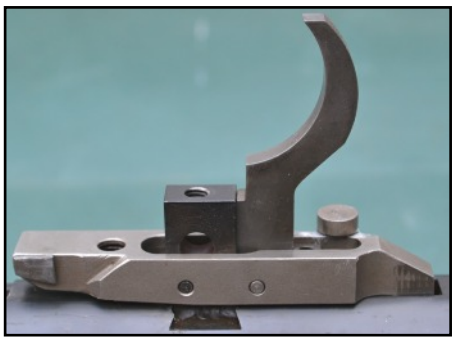
The steel receiver is machined from solid bar and then profiled to obtain its external shape and reduce weight. The front of the receiver is milled and threaded which permits a locking ring to secure the barrel onto its seating. On the right side is the ejection port and the underneath the recess for the magazine. Moving back from the magazine recess there is a rectangular block welded into a dovetail slot which supports the trigger assembly and to the rear of this, is the tang which is very similar to that found on classic military Mauser’s. Running central down the length of the tang to the magazine recess is a groove to accommodate the bolt’s cocking piece and in the same groove is two recesses which allow the passage of the sear and the bolt stop.

The left side of the receiver is also profiled and is engraved with the manufacturers title, the rifle name and serial number. On the top of the receiver is an observation port for aligning the barrel stud and a machined recess for seating and securing the scope rail. There are two scope rails available, basically one short and one long to accommodate different military weapon sights, however they are not a true picatinney rails and therefore not all attachments will fit. This became apparent when I purchased a picatinney 30mm mil-spec tactical one piece scope mount and released they weren't compatible. To overcome this incompatibility I had to mill the base and also the mount to make them fit. Another criticism is the small size of the ejection port, if a empty case drops back in, you cant get your finger in to hook it out and must turn the rifle over to remove the obstacle.

Trigger Assembly

The trigger assembly functions in the same manner as the classic military Mauser with the trigger acting as the cam and providing an adjustable double pull. Its construction is solid steel throughout and consists of only seven parts. The principle difference with this mechanism and the Mauser system is its substantial and solid build, the sear block supports the bolt stop at the rear and at the front of the sear block is the locking faces which engage with the safety catch.





The CAM most be one of the most simple and substantial trigger mechanisms I have ever worked with and as a result component and combat failure rate must be absolutely minimal. Similar to the Mauser system the whole assembly is held in place by two pins and to remove the bolt the user must pull the bolt to the rear and at the same time fully depress the trigger. I polished the sear and cocking piece bearing surfaces and by adjust the trigger screw reduced the trigger pressure to 3.9lbs.

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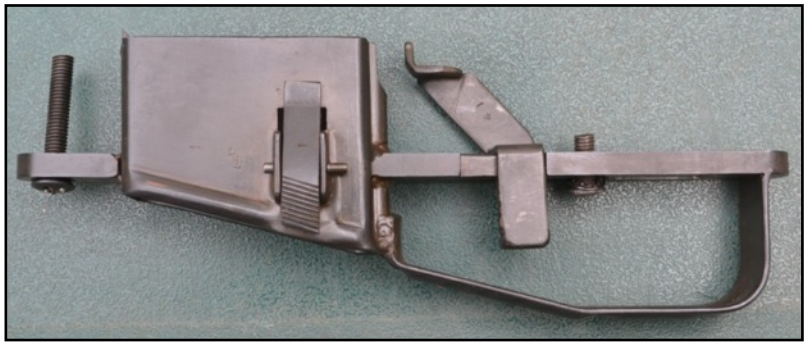
Trigger Guard/Magazine Housing

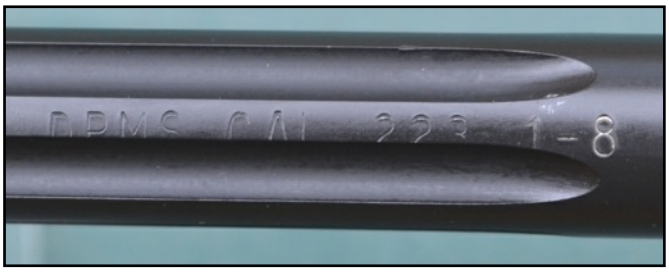
The trigger guard/magazine house consists of multiple steel sub sections welded together into one unit, together with the safety and magazine catch. The principle feature is the housings ability to use AR15/M16 magazines, This particular housing is suitable for traditional AR magazines and not the later polymer types.

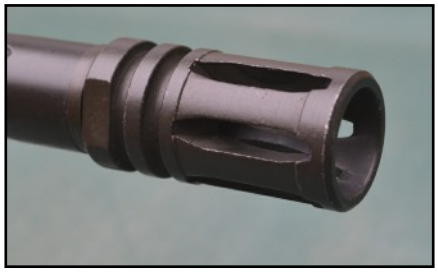


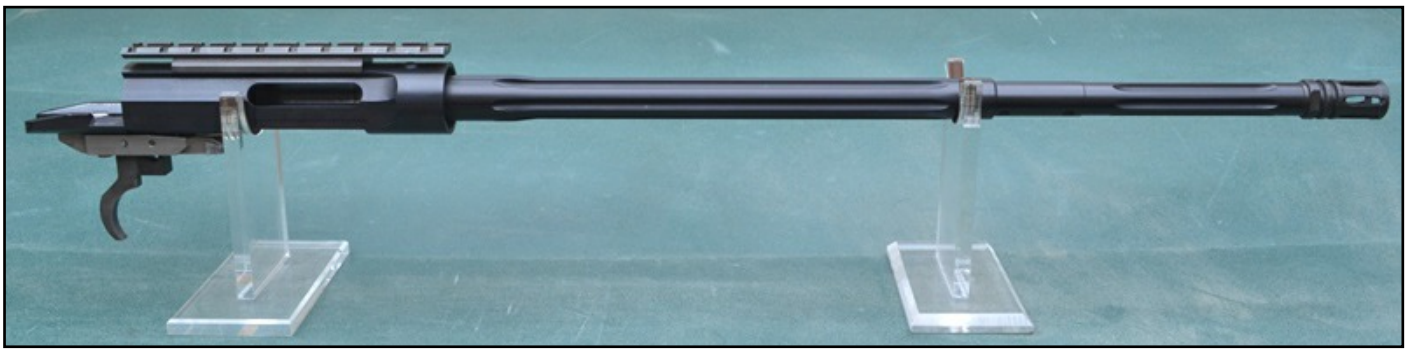
When assembled, the safety catch is located forward of the trigger. The safety catch profile is that of a cylindrical drum welded to a plate, which when pulled to the rear engages with the sear block, locking the trigger mechanism and the bolt. When pushed forward it realises the sear block therefore allowing it to rotate and lowering the sear. Detent action for the safety catch is provided by a spring loaded ball bearing, however it was here that I identified a problem as the safety would engage with the rifle stood on its butt. Researching the matter further, I identified a weak spring as the cause of the problem, which I duly replaced and the matter was resolved. As can be seen in the image above, the trigger guard is very spacious and without any modification permits the user to wear gloves or mittens for arctic warfare environments.

Barrel

The fluted heavy barrel is 20" In length and is fitted with a military flash eliminator giving a total length of 21" The barrel is stepped allowing for the flash eliminator to be removed a sound moderator to be fitted. This barrel was supplied by the US manufacture







DPMS and has a twist rate of 1 in 8, which permits bullet weights up to 70grn. Although this twist rate can accommodate heavier bullets, bullet weight is limited by the magazine. As this is a AR15/M16 spec barrel, it assembles to the receiver in exactly the same manner as the traditional AR15 and the bolt and barrel lock using exactly the same method, making this rifle very attractive and cost effective to countries already using that rifle system.

Breech Block

The breech block mechanism is central to this rifles design and what's makes it unique. Its a substantial affair and consists of five major components, breech block, carrier, firing pin, bolt handle and cocking piece. The breech block or bolt head contains the ejector and extractor and it identical to the standard AR15/M16 but unlike the AR15 the breech block does not rotate and is fixed into the carrier by a large stud and roll pin. The carrier is a solid steel cylinder which has been machine internally and externally. Externally the carrier has a front and rear bearing surface with the area in between being of slightly reduced diameter to permit

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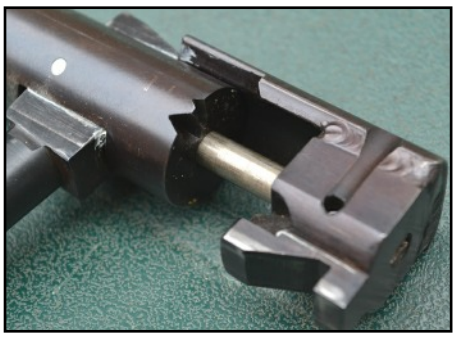
the passage of debris. At the front and on the underneath of the carrier is number of machined grooves which allow the carrier to pass over the magazine. To the rear of these grooves is a projection which primary role is to engage in the receiver and acts as the carrier guide, aligning the carrier assembly with the receiver and the breech block with barrel locking lugs. Its secondary role is to



engage with the safety catch and when the safety is applied prevents the bolt assembly from opening or closing. At the rear of the carrier is a rectangular slot which the bolt handle passes through and bears against the receiver. The bolt handle is allowed to rotate slightly about its offset axis pin and against a spring loaded ball bearing which returns it to its original position. Lifting the bolt handle 23° disengages the breech block from the locking lugs, pulling on the bolt handle allows it to rotate and provides a camming action which provides primary extraction. This “camming action” is where the CAM rifle gets it name as it prevents hard extraction, ensures a smooth operating cycle and prevents split cases. AR15/M16 rifles do not have primary extraction as there is sufficient energy in the gas cycle to overcome any hard extraction.

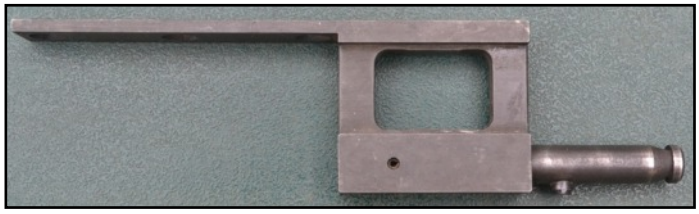
At the rear of the carrier is the cocking piece which functions much in the same way as the Lee Enfield bolt mechanism. At the bottom of the cocking piece is the sear bent and to the rear of this, the safety bent. When the bolt is pushed forward the cocking piece is held back on the sear, pulling the trigger, depresses the sear and releases the cocking piece which is attached to a spring loaded striker which in turn strikes the floating firing pin and initiates the round. At the rear of the carrier and shown in the image top right, are two bents, the largest of the two provides mechanical safety. There is a corresponding projection on the cocking piece and only when these two align and the breech block is fully closed, can the firing pin strike the primer. When the bolt is opened, the smaller of the two bents withdraws the cocking piece and the striker, allowing the firing pin to float and thus withdraw from the breech face.

The 23° bolt lift permits a very fast bolt cycle, in fact not including straight pull actions, this rifle must rated as one of the fastest. Feed and extraction is very reliable with empty cases being propelled clear away from the rifle. However unlike automatic actions empty cases can be easily captured and thus avoid leaving any evidence should the rifle be used in the sniping role.

Furniture

Early wooden stocks tended to be very traditional with a style not unlike a WWII rifle, however I have seen numerous designs over the years. As this rifle is a demo model its laminate stock is very similar to the latest rifles fitted with carbon fibre stock, however when I received the rifle, the stock was fairly basic and needed some restoration.

The forend is fitted with large heavy bracket which contains a spigot for the bipod, although a bipod was not supplied, its design is very similar to the versa-pod. The bracket is solid, substantial and serves no other purpose than to support the bipod, which adds considerable bulk and weight to the rifle and therefore in my opinion required replacement with a more modern and practical design.



On standard rifles the stock is a simple wood to metal fit but on this rifle the action was bedded and the barrel floating, which adds to the rifles accuracy.

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The centre section of the butt has been removed, this I believe is to do with the later carbon fibre stock and therefore this stock may have been used as a template. However its not to my taste and I would have preferred it as a solid design. A simple nylon sling is provided, however there are no sling swivels and therefore the sling passes through the centre section of the butt and bipod bracket. A crude setup which requires improvement.

The two holes in the cheek piece are for a wooden cheek piece extension when the rifle is fitted with a night sight. A bit crude but I have left the hole untouched rather than filling them in.

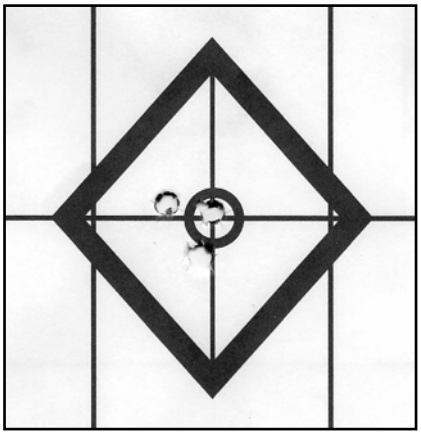
The butt plate is metal and on this rifle was poorly fitted. It has an extension plate which increases the overall butt length by an inch and using the hole in the centre of the butt plate can be adjusted for height. The whole affair is overly substantial and adds considerable weight to a already heavy rifle. Whilst this is a mil spec rifle, you could create some serious damage with this butt assembly, however I cannot help thinking that this is a poor design and therefore I replaced it with a much more lighter rubber and aluminium civilian design.

I replaced the bipod bracket with a steel rail and to that I added a steel picatinny rail so I could achieve the correct height. I added a further short picatinny rail to the butt tang and therefore could now add a decent monopod or sling swivel of my choice.

Magazine

Like the barrel and bolt assemblies, the magazines heritage is from the AR15 and therefore in theory are interchangeable. However in practice I found this wasn't the case and that only the more traditional AR15 magazines would fit. The newer Style M4 polymer magazines are too large and would not even fit into the magazine well and other magazines would simply bind or jam against the bolt carrier. Another issue was the very strong magazine spring which was designed for a semi or fully automatic rifle. With the CAM being a manually bolt operated rifle, it required some force and fairly fast bolt cycle to function smoothly, mimicking the semi-automatic function. Cycling slowly as one would with more tradition bolt action design makes feeding more erratic and therefore to reduce this effect I reduced the spring pressure on the magazine platforms.

Range Test



My first range test was simply to remove the bipod, its bracket, fit a scope and benchmark the rifles performance and was carried out prior to the rifles restoration. I fitted a x6 Schmidt & Bender and shot from the bench with my target set at 100yrds. Having adjusted the zero I set about producing the best group. Ammunition was 69grn Sierra matchkings and 24gr of N140, a combination that I had developed for a previously owned AR15. The best group was 13.5mm as shown, however as mentioned previously, cycling had to be pretty slick to generate a smooth feed which I thought may damage the bullet. Ejecting a live round verified my concerns and there was a clear score mark on the bullet where it was being fed up the feed ramp and had caught on the locking lugs.

Further testing revealed a couple of other minor faults, the grub screw for adjusting the trigger had worked loose and as a result the rifle had lost its double pull, also the bolt stop when fully depressed would not release the bolt.

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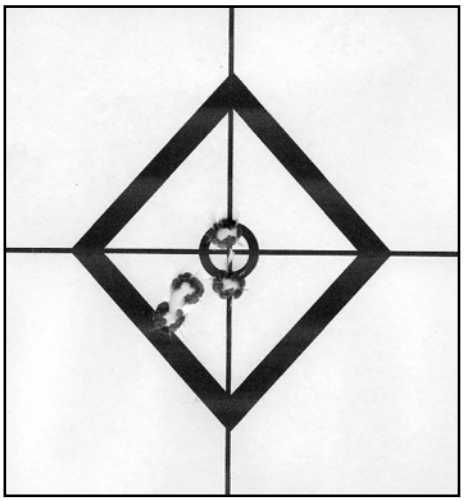

Having restored the rifle and made repairs to the faults mentioned previously, I headed of to the range. Whilst I had restored the woodwork, added new components to the stock and added a 6-12x50 S&B I hadn't altered the rifle in any way except to polish the trigger mechanism and reduce the rifles overall weight. The new group was 18.6mm, remove the flyer and I was back to 13.5mm and therefore no change to the earlier test. Could this rifle do better, possibly with a match barrel but then its not a milspec rifle anymore and the weight would increase.

Whilst the rifle cycled without fault I still had to function the bolt with some gusto to produce a smooth feed. I had reduced the spring pressure on the magazine by one spring loop but was still suffering from erratic feed when slowly cycling the bolt, therefore I reduced the spring length by a further loop. This solved the problem but it highlighted an a larger problem in that this rifle will only function with the original style magazines. It doesn't like the latest crop of plastic mags which will deter potential buyers but it did appear to be at home with standard magazines supplied by Brownell Inc. Another experience and minor niggle was the AR15 bolt head and the lack of camming action. This has been overcome during the extraction process with the cam bolt handle but on the feed cycle the user must ensure the bolt is fully home before trying to depress and lock the bolt. This presents a slightly unusual feeling as most bolt actions want to “naturally” close and an inexperienced user will tend to push the bolt twice to overcome this issue.

Summary

As a proud Brit this British bourne and bred design appeals to me immensely. The rifle is an unusual on the civilian UK shooting scene as the rifle is aimed at the paramilitary/military market and therefore many do not filter through to the domestic market, which further adds to the appeal. Whilst the action is very strong and immensely robust, its all steel construction add considerable weight (14lbs) and from a soldiers standpoint I would expect .308 performance from a rifle in this weight bracket. My replacement of the steel butt assembly, old style bipod and spigot, assisted in the reduction of the rifles overall weight however I could have improved this further by utilising aluminium picatinny rails rather than steel.

Personally I like this rifle as I wanted a .223 with a difference however from a design concept the use of AR15 components has both a positive & negative connotations. Using proven off the shelve components is a major cost saving and a logistical benefit but the bolt head prevents a smooth cycle action which may turn some buyers off.

In all my Armourers notes I strive to highlight the rifles good and bad points, however in this case it is unfair of me to be too critical as this is a demonstration rifle and not a production model and I know for example that the new derivative has a carbon fibre stock which will certainly reduce the weight issue. Getting a rifle from the design board to the market place is a herculean task and BMS should be applauded for their bold, imaginative design and from an Armourers point of view this is a fascinating and interesting rifle to study.

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